definition that will encourage the development of a high power cellular look-alike service. This would be a mistake.

PCS is essentially the set of communications services derived from emerging technologies that can be operated on fixed networks, cellular radio networks, intelligent networks and combinations of these. By examining the experience in the UK since the late 1980s, the FCC can develop a more enlightened approach to PCS development. Based on that experience, the FCC should take specific steps to promote the competitive deployment of PCS in the US. We recommend that the FCC:

- Avoid defining PCS too narrowly in terms of specific technologies or services -- as has happened with PCNs in the UK. Otherwise PCS runs the risk of becoming a cellular look-alike, and new service objectives will be hindered.

- Issue local licenses and avoid nationwide licenses. This allocation procedure will ensure greater responsiveness to specific customer needs and promote innovations. It will also help ensure the financial success of the new services and will speed deployment of PCS to more rural and less populated areas.

- Allow incumbent telecommunications operators to be eligible to hold licenses. The service will benefit from those companies' vast experience with providing telecommunications services. Also, this will allow for bi-

directional convergence of mobile and fixed services, in line with present technological developments. As such, participation by incumbent carriers will make PCS more economical and competitive.

2. A REVIEW OF PCS DEVELOPMENTS IN THE UK

The Structure of Telecommunications in the UK

The UK has been one of the most dynamic countries in the world with respect to the implementation of telecommunications services. At the beginning of the 1980s, the UK had a single national public fixed voice telephony operator, BT, owned by the state, and a small municipally owned local operator, Kingston Communications. The commitment to privatise BT led the Government to seek an additional nationwide fixed public voice telephony operator. This is in sharp contrast to the position in the US where the AT&T divestiture led to a break-up of telecommunications services and a movement away from nationwide licensing.

The UK telecommunications sector was first liberalised in 1982 when a second national fixed voice telephony operator, Mercury, was granted a license. In 1984, BT was privatised. Just prior to BT's privatisation, in 1983, the UK Government stated that the duopoly provision of national fixed voice telephony would be maintained for seven years, and that the Government would evaluate the situation again in 1992. (The results and implications of the Duopoly Review for PCS are discussed below.)

Today there are two privately owned national fixed telecom operators (BT and Mercury) and two additional companies using radio (Millicom and Ionica L3) are scheduled to

commence fixed operations in the near future. In addition to these operators, there are two national analogue Total Access Communications Systems (TACS) cellular radio networks (Cellnet and Vodafone); two national Group Speciale Mobile (GSM) operators (the pan-European digital mobile communications system); two PCN licensees (Mercury PCN and Hutchison) with one license under review by the DTI; one operating telepoint service (Hutchison); three mobile data operators; seven wide area paging operators; one national and many regional trunked Private Mobile Radio (PMR) operators; many cable-TV companies offering local telephony services; and many on-site paging and PMR systems.

Operators in almost all of the above mentioned services require licenses to function and these are awarded subject to technical constraints and occasionally to winning "beauty contests", as in the case of PCNs described below. License awards in the UK are made by civil servants on the basis of submitted information from applicants.

Mobile Cellular Communications in the UK

In mobile (cellular) communications, [6/] the principal UK governmental authority is the DTI. In 1985, the DTI first awarded licenses for cellular radio communications to two national operators: Cellnet (a subsidiary of BT owned jointly with Securicor) and Vodafone (which at that time was owned by Racal Electronics). At the time, BT had a near monopoly on switched voice telephony, and it was prohibited from operating a cellular service directly; it was permitted to indirectly operate a cellular subsidiary.

6/ In the UK, "mobile" refers to services used primarily in vehicles.

Cellnet and Vodafone operate analogue systems (TACS, a version of AMPS in the US) around 900 MHz.

Analogue TACS began operating in 1985 and it has approximately 1.2 million subscribers today. Vodafone has slightly more subscribers than Cellnet. Cellnet has a base of 570,000 subscribers of which 79% are small businesses (with less than 100 employees), 17% are corporate clients and only 4% are individuals. Cellnet has invested some £700m in TACS, a very sizeable investment. Growth in subscribers to TACS has slowed in recent times, due in part to the recession but mainly to saturation of business sector demand at the current set of tariffs. In an effort to stimulate additional subscribers, both Cellnet and Vodafone have recently devised a set of low volume user tariffs (see below).

Pan-European efforts have also influenced developments in the UK and have paved the way for the introduction of digital cellular communications. This effort became known as Group Speciale Mobile (GSM) and a Memorandum of Understanding regarding the service was signed in 1987. GSM is to operate in the UK around 900 MHz and will provide for inter-system roaming across Europe. Cellnet is to launch GSM in mid-1993 and it will provide national coverage by the end of 1994. The cost of handsets for GSM is expected to be initially high and thus the operators expect subscribership to be relatively low. It is expected that GSM will initially be used largely by business users, many of whom will migrate from lower quality TACS, thus freeing capacity for low volume users.

The Introduction of Personal Communications into the UK: Phase I "Telepoint"

In the late 1980s, the DTI devised a strategy for introducing mass personal communications [7/] and published its views in a document entitled "The Infrastructure for Tomorrow" (1988). This document placed an emphasis on stimulating competition and viewed mobility/portability in communications services as a key component in achieving this. The DTI pushed for the introduction of the access technology CT2 (second generation digital cordless telephone) because of its view that there was a large latent demand for portable communications.

In 1988, the DTI awarded four nationwide licenses to operate CT2. CT2 has become known as "Telepoint" and it operates around 900 MHz. CT2s provide access into fixed link systems -- literally portable phone booths. It was conceived largely as an access technology; thus, the licenses were designed to permit only outgoing calls to be made.

Of the original four consortia awarded licenses, only one remains actively operating, Hutchison's "Rabbit". The survival of just one of the original four CT2 operators is regarded as a failure. Several factors have caused this, including technical limitations, over-optimistic market forecasts, the initial lack of a common air interface standard (CAI) and the general economic downturn. Analysts believe that the high sunk costs associated with the provision in the licenses to establish national coverage within a

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7/ In the UK, personal communications usually refers to services provided for use with hand-held portable devices.

specified period also had a significant negative impact. In addition, the Government itself undermined the service by announcing, soon after awarding the CT2 licenses, that it planned to free spectrum around 1.8 GHz to support PCNs, a fully interactive personal communications service. Not surprisingly, interest in Telepoint, a more limited communications service, waned.

The Introduction of Personal Communications into the UK: Phase II "PCNs"

In the UK it was originally believed that by the early 1990s there would exist inexpensive, lightweight handsets capable of supporting portable communication networks or PCNs. PCN was envisioned as a low-cost, high-volume service which would appeal to the mass market. It was viewed as the first system which would bring both fixed and mobile phone applications together. As discussed below, the Government's objectives do not appear likely to be achieved in the near future.

In the document "Phones on the Move," the DTI promoted PCN as a "new generation of mobile radio systems distinct from cellular radio systems yet will compete with them for the market they will be serving in the 1990s - The market for personal communications." The DTI also stated its view that "For purely personal communication applications, handover is unlikely to be needed. This would permit simplification of the network and potentially lower infrastructure cost." However, the DTI acknowledged that if PCN was to compete with the "car phone market" handover would be an essential feature.

The DTI solicited comments on PCN licensing issues. Given the time at which the questions were published (January 1989 when the cellular operators Cellnet and Vodafone were making significantly high returns) it is not surprising that respondents espoused the view that PCN should feature handover and be set up as a competitive service to the cellular market.

In December 1989, the Government selected three consortia to provide PCNs. The selection criteria consisted of a "Beauty Contest"; that is the DTI chose those consortia that looked the most attractive, subject to technical and financial constraints being satisfied. The successful consortia were: the British Aerospace Consortium, "Microtel", "Unitel" (involving STC and US West) and Mercury PCN Ltd. The cellular operators (along with BT) were prohibited from applying for PCN licenses in the UK.

Each PCN licensee commences with a requirement to provide a national service. Each consortium was informed in July 1991 that by the end of December 1999 it should be able to provide or offer to provide services procured by inter-system roaming in an area where 90% of the UK population live. The DTI released 150 MHz for PCN (1710-1880 MHz), the largest commercial allocation of spectrum ever made in the UK (excluding broadcasting). The initial allocation for PCN is around 25 MHz per operator, but the recent merger of Unitel and Mercury PCN Ltd (see below) has left this situation under review. [8/]

8/ This was confirmed in an interview at the DTI with Nicholas Davidson on 25 September.

In the UK, PCN (the second phase of PCS) has become an extension of cellular radio. The Government acknowledged this fact in a Consultative Document in November 1990 where it stated that "These networks [PCN] will provide additional competition to the two existing cellular radio networks."; the Government has also stated that it "d[oes] not anticipate any further major developments in new mobile telecommunication systems for some time." 2/

PCN cells vary in size from 2 km in diameter to up to 16 km in rural areas; thus, the cells are comparable in size to those used in providing existing cellular services. Because the licensees must construct national networks it is very expensive to install capacity. The original costs quoted by each of the licensees were of the order of magnitude £1.3bn each. The licensees, faced with such high costs, have not been willing to self-provide all the necessary infrastructure to operate the system. Links from MTXs into the public switched telephone network (PSTN) or into leased lines are to be carried by fixed operators. Subsequent to the initial award of the licenses, the DTI decided to allow operators to share infrastructure costs in rural areas. This was done in an effort to foster universality and speed of deployment in recognition of the significant costs of providing a nationwide service.

In June 1991, Hutchison Telecom purchased Microtel from British Aerospace and in turn British Aerospace took a 30% stake in Hutchison. In March 1992, Mercury PCN merged with Unitel, following close collaboration between the two on infrastructure sharing for

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2/ "Competition and Choice: Telecommunications Policy for the 1990s: A Consultative

PCN. Mercury initially perceived PCN as being capable of standing alone from the PSTN, ultimately giving rise to a wireless free PSTN. Because of the large infrastructure costs of universal service provision, Mercury's views, however, have changed dramatically and PCN is seen much more as an access technology to its fixed PSTN. This led Mercury to close down its CT2 "Callpoint" operation, which was also designed as an access technology.

The PCN licensees were given 8 years to satisfy the nationwide coverage requirement (90% of the UK population), but whether this target can be realistically achieved will depend on the financial success of the operators. By setting the service up as a cellular look-alike and by requiring nationwide coverage, the UK Government has made the financial success of the PCN service a less likely proposition. Thus, it remains to be seen whether the coverage target will be met by the licensees.

The nationwide coverage requirement has led the licensees to focus their attention to providing service initially in large urban areas, such as London. In addition, the long lead time (8 years) for nationwide coverage will further delay service provision to many areas of the country. Consequently, rural areas will be neglected for many years. Moreover, even when service coverage is provided to such areas, the nationwide licensees will not have the same incentive to provide varied and innovative services meeting local needs because of financial constraints. [10/]

[10/] Mercury PCN is expected to commence services in 1993. Hutchison Microtel is expected to commence operations sometime in 1994.

PCN in the UK is being developed in line with international initiatives in mobile telecommunications, particularly in Europe. There are two main European initiatives taking place, Digital European Cordless Telephone (DECT), the next generation of telepoint, and GSM. The DTI ruled that PCN should be based on a European standard, with the preferred candidates being GSM or DECT. The three successful PCN applicants all indicated GSM as the appropriate technology. In terms of exploiting new technologies and generating new services, the decision to use GSM for PCN will limit service possibilities. The Organization for Economic Cooperation and Development (OECD) has stated that "GSM does not even represent a significant improvement in spectrum efficiency over conventional analogue alternatives. By any commercial measure, GSM must be judged a failure up to the present." [11/] This service limitation taken together with the nationwide coverage requirement cast doubt on the long term viability of PCNs in the UK.

In response to the imminent launch of PCN, incumbent cellular operators have launched aggressive marketing policies to attract personal users. Vodafone has launched a strategy designed to counteract migration to PCN through what it calls its "Micro-Cell Network" (MCN), which is essentially a scaled down version of its digital GSM service. Furthermore, Vodafone has introduced a "Low Call" tariff package, following Cellnet's choice to package its existing TACS analogue service in a way that can accommodate low volume user, low mobile customers: a sort of "infrequent caller programme." Cellnet

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11/ OECD Working Party on Telecommunication and Information Services Policies, "Mobile and PSTN Communications Services: Competition or Complementarity?", at para. 91, June 1992.

has devised a tariff package that gives low volume users lower rents and inexpensive off-peak calls in return for a lower quality and more restricted form of service.

The nationwide coverage provision in PCN service and its classification as a cellular look-alike service is affecting its development and success. PCN and cellular will be competing head-to-head in the business and consumer portable phone sector. Further, existing cellular operators are devising ways to attract low volume low value subscribers to cellular. By the time the cellular look-alike PCN arrives, many potential customers will have already subscribed to some variant of TACS or GSM. Thus, nationwide coverage requirements and Government encouragement for PCN to be a cellular look-alike instead of being a forerunner of new services, may well force the PCN operators to offer high value premium services in densely populated areas as a way of recouping investment costs. This will undermine the UK's commitment to establish new and varied personal communications services throughout the country.

The Introduction of Personal Communications into the UK: Phase III "The Duopoly Review"

The Duopoly Review represents the largest and most important policy shift in UK telecommunications since the privatization of BT. [12/] In the Review, the UK Government officially announced the end of the fixed services duopoly. The Government announced it would consider new license applications to provide telecommunications services over fixed links within the UK. Since then, many license applications have

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12/ See "Competition and Choice: Telecommunications Policy for the 1990s" London: HMSO, Cm 1461, March 1991.

been lodged with the DTI to provide fixed services nationally and regionally. Cable TV companies have also been permitted to operate fixed services without being required to rely on BT or Mercury.

In terms of PCS, the Duopoly Review has now allowed for uni-directional convergence of fixed and mobile services with present mobile operators being permitted to apply for licenses to operate fixed services. Both Cellnet and Vodafone have submitted license applications to provide fixed services. However, the converse, with fixed operators being permitted to operate mobile services, is not allowed at present. Originally, in the Consultative Document the Government stated that it was "prepared to consider allowing fixed operators to make greater use of radio based services to provide the final link to a customer's premises, provided that a satisfactory distinction can be maintained for licensing purposes between this and a full mobile or Telepoint Service." [13/] Response to its consultative document, however, led the Government to maintain for the time being the restriction on fixed operators from providing mobile or services. Thus, the position of the fixed operators with respect to mobile and portable services (including the dominant company, BT), remains ambiguous.

The interim nature of the Government's decision may well reflect the fact that convergence between fixed and mobile services is inevitable and that technical boundaries

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13/ "Competition and Choice: Telecommunications Policy for the 1990s" A Consultative Document, London: HMSO, Cm 1303 at para. 7.51, November 1990.

are becoming increasingly blurred and difficult to define. [14/] For example, it is unclear how the UK authorities will deal with "virtual mobile" systems: the use of the fixed network to provide look-alike mobile services. As PCS technologies develop further, UK regulatory authorities will likely receive requests from fixed operators to substitute radio links direct to portable phones for copper pairs. It appears that keeping fixed operators out of these new services will hardly benefit consumers.

Summary of UK Developments in PCS

- The UK has introduced PCS in three distinct phases. First, Telepoint was introduced, second PCNs were introduced, and the third phase is ongoing, following the Duopoly Review. The UK policy has been one of trying to lead the field as technical developments take place but the outcome has resulted in a premature deployment of technology in the marketplace, the failure of the Telepoint service and general uncertainty. The uncertainty stems in part from ongoing ambiguity surrounding the treatment of fixed operators vis-à-vis mobile services. Furthermore, the promotion of PCN as a cellular look-alike service and the subsequent heavy investment by companies will make it less likely that the UK will be flexible about bi-directional convergence of mobile and fixed services in the future. The FCC should avoid categorizing PCS as a cellular look-alike service and should permit bi-directional convergence of fixed and mobile services. This will require participation by existing communications operators to succeed.

[14/] See OECD Working Party on Telecommunication and Information Services Policies, supra.

- The UK has issued nationwide licenses and insisted on stringent universality conditions. This has placed a considerable risk burden on the investors providing the financing for PCN, because each operator requires a considerable sum (around £1.3bn) to implement services. Nationwide licensing, combined with universality requirements prompted Mercury PCN and Unitel to work together to share the high set-up costs of developing infrastructure; ultimately this led to their merger earlier this year. Consequently, prospects for multi-party competition within PCN have diminished. The Government's universality requirement will also delay the provision of new and varied services to more rural and less populated areas of the UK. Based on this experience, the FCC should avoid issuing nationwide licenses for PCS.

- The UK awarded PCN licenses on the basis that the new operators would present new competition for the existing cellular operators. PCN license holders were actively encouraged by the Government to implement cellular look-alike services. This immediately cast PCN as a modified version of cellular and has reduced significantly the prospects for new services and product innovation. Furthermore, the Government made the incumbent cellular operators and BT ineligible to hold PCN licenses. Again, this has reduced opportunities for new product diversity.

3. RECOMMENDATIONS FOR PCS DEVELOPMENT IN THE US

The following recommendations for the FCC can be drawn from the UK experience with PCS:

- Licenses ought not to be defined in terms of existing technologies or services such as PCN in the UK; otherwise PCS runs the risk of becoming a cellular look-alike service. This will limit new service diversity. Low power new services are preferable.

- The UK approach of nationwide licenses and the imposition of stringent universality requirements provided strong incentives for license holders to focus their investments and initial efforts on densely populated urban areas. It also significantly impacted the financial costs of providing services. Local licenses at the MSA and RSA level are preferable to large regional or nationwide licenses. Such an allocation will ensure greater responsiveness to customer needs, particularly in rural areas, and promote service innovations. It will also make the service more financially attractive.

- All telecommunications operators should be eligible to hold licenses to allow the development of PCS to benefit from the valuable experience of incumbent communications providers. This will help to ensure customer responsiveness and will promote new product diversity. Furthermore, by permitting extensive eligibility, bi-directional convergence of fixed and mobile services will be determined by market processes in line with technical developments. The UK approach to date of only

permitting uni-directional convergence (mobile to fixed) is slowing down product diversity and innovation.

The FCC can benefit enormously from examining the UK experience in personal communications. By avoiding the mistakes made in the UK, and by emulating those successful components, the FCC will be able to create a competitive and successful market structure for PCS.

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November 1992

Gantt Report

FINANCIAL ANALYSIS: MSAs AND RSAs SHOULD BE USED FOR PCS ALLOCATION PURPOSES AND EXPERIENCED COMPANIES SHOULD BE ELIGIBLE TO PARTICIPATE

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November 1992

FINANCIAL ANALYSIS: MSAs AND RSAs SHOULD BE USED FOR PCS ALLOCATION PURPOSES AND EXPERIENCED COMPANIES SHOULD BE ELIGIBLE TO PARTICIPATE

By: Wayne D. Gantt [*]

Introduction - The MSA/RSA Model

The geographic distribution of Personal Communication Services ("PCS") licenses will have a significant impact on the evolution and success of this important service. In making this critical determination, the Commission should use the established Metropolitan Statistical Areas ("MSA") and Rural Service Areas ("RSA") used for licensing cellular services. The larger geographical service area blocks proposed by the Commission (including the option of a single nationwide licensing area), would negatively impact on the provision of services to the public and on financial support for PCS.

The delivery of economically and financially sound communications services should be based on a rational economic approach. The Commission's use of MSAs for defining service areas for cellular licensing purposes was based on the U.S. Office of Management and Budget's use of MSAs to group areas with identifiable economic and social ties. The MSA designation is a standard economic and statistical measure which is used by government and others to analyze geographic areas in identifiable groups. The general concept of an MSA involves designation of a large population nucleus with adjacent communities which have a high degree of economic and social integration with that nucleus.

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The Commission will be well-served by again relying on the MSA model for defining PCS service areas. The economic and social ties reflected in the original MSA designation areas used for cellular licensing remain valid; moreover, the telecommunications industry and financial entities are very familiar with this licensing scheme.

In addition, use of the RSA model also has value. These areas were specifically developed by the FCC for licensing cellular systems in areas outside the MSAs. The designations are again based on economic, social and other ties between counties (and were established and refined after a long public process); as with the MSA designation, the public and financial markets have experience with this licensing standard, and thus it provides needed certainty to the PCS process.

Use of the MSA/RSA model would serve the public interest. The choice of MSAs and RSAs as the service area building blocks should be driven by market and economic logic and by prior experience. To avoid the waste and expense of misallocation experienced in other services delivery (*e.g.*, the early experience of PCS-type service in the United Kingdom), the communication service areas should be decentralized to smaller, more efficient market areas.

An MSA/RSA Allocation Would Serve the Commission's Goals

The FCC's goals, as stated in the Notice of Proposed Rulemaking, call for diversity, speed of deployment, competitive delivery and universality. These goals would be served by MSA/RSA licensing.

- By using MSAs and RSAs, instead of larger service area definitions, the FCC will be better able to promote diversity in PCS offerings. Smaller and more decentralized operating areas will provide greater variability and specificity of services. As such, business and residential services will be developed which better meet the needs of local markets.

- A building-block strategy of allocating communications services by MSA/RSA areas will likely increase the actual speed of deployment of PCS services. By building systems from the bottom up, the services provided will be more efficient and targeted; thus, the possible misallocation of technology and costs are minimized.

- If PCS is licensed at the local level, the service will be more attuned to local financial markets, and it is more probable that effective competition will develop. More PCS providers will yield a more competitive delivery system for PCS services. In other "service" industries, such as banking and legal services, service providers have found that the delivery of product becomes more customized, and more marketable, in smaller units. Enhanced competition would accrue from such geographic specificity.

- Smaller service areas will increase the participation of smaller entrepreneurs and will again promote competition and diversity in service products.

- Using the MSA/RSA standard will make it more likely that large areas of the country, including less-populated areas, will be provided with PCS service more quickly. Use of larger service areas would mean that licensees would likely focus their immediate attention on more populated urban areas; clearly, they will not have the same incentive to promptly deploy service in smaller areas of the country. This would be contrary to the Commission's universality goal.

Capital Markets Will Favor Smaller Service Areas and Experienced Companies for PCS Allocations

The success of PCS will depend largely on the response of financial investors to service possibilities and returns. Two general issues regarding PCS will be of interest to the capital markets: 1) who will be allocated monies?; and 2) which participants will generate sufficient returns on investment?

In the current environment, many financial institutions are reluctant to commit funds. Moreover, the demand for capital is presently not great. Commercial and industrial ("C&I") loan activity for this phase of the business cycle continues to remain low by historical

standards. In fact, C&I loans were down approximately eight percent in early October 1992 from a year ago.

Capital markets are still adjusting to economic developments and the impact of the frenzied real estate markets of the 1980s and early 1990s. Historically, problem loans lag behind a turn-around in economic activity. Thus, even with a return to economic growth, problem loans continue to crop up in bank portfolios. There have also been six consecutive quarters of expanding GDP. Banks are less likely to make venture capital commitments in such an environment. And, in particular, financial institutions are less likely to make sizeable loans. The technology sector has also been negatively affected by the recent recession, and banks remain wary of making significant financial commitments.

In the current economic environment, smaller loans for PCS purposes are more likely to be executed. Thus, a diffused market, characterized by a large number of market areas and licenses, will allow better access to capital. In the present financial atmosphere, banks are more willing to make small loans to more entities, in order to spread credit risks. This indicates that focusing PCS service areas at smaller units will better free up venture capital.

By utilizing the existing framework of MSAs and RSAs, the Commission would be enhancing the strategy of atomizing the market in an economically and financially rational way. Because the MSA/RSA model is known to the telecommunications industry and to financial markets, using the same areas for PCS license distribution will provide greater certainty in valuation and financial analysis. This will again help assure the success of PCS. In sum, since the MSA/RSA model is familiar to industry and the public, such an allocation would be market-friendly.

Finally, involvement by existing communications providers will also help assure the financial success of PCS. First, the need for adequate returns on investment benefits

regional operating companies and other well-capitalized and experienced competitors (both big and small). Capital investment, marketing costs and technical expertise are all carefully analyzed by Wall Street and the banks. As such, many existing communications providers are positioned to provide secure and consistent returns on investment in this new market service. Again, smaller market areas, such as those defined by the MSA/RSA model, would provide good opportunities for well-capitalized and experienced competitors to secure venture capital. Moreover, firms that focus on geographic "niche" areas of service can also be positioned to provide consistent and proper returns on investment, by relying on specific service needs of smaller communities. Use of a smaller service area allocation will promote this value.

Summary

Allocating service licenses based on geographic markets that are well-defined and more localized would promote the Commission's PCS goals. Use of the MSA and RSA model will promote service diversity, expeditious deployment, universality and competitive delivery objectives. Economic and commercial logic suggest using markets that are consistent, definable and understandable. This will improve financial support for PCS, and will allow the service itself to be more cost-efficient. The MSA/RSA areas utilized by the Commission for cellular licensing purposes have proven effective and are well known to the telecommunications industry and financial investors. Using the same distribution scheme for PCS will significantly promote the financial viability of this important new service. Allowing existing communications providers to participate will also help assure the financial success of PCS.

NERA Study

ASSIGNING PCS SPECTRUM: AN ECONOMIC ANALYSIS OF ELIGIBILITY REQUIREMENTS AND LICENSING MECHANISMS

Prepared for:

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[1] NERA is the world's largest international economics consulting firm specializing in telecommunications market structure analysis, regulation and privatization. The company has been a leading economic consultant to U.S. telephone companies over the past 20 years, and its economists have regularly worked with industry on pricing policy, issues of industry structure and regulation and competitive strategies. NERA's major telecommunications clients include the Bell Operating Companies; GTE; United Telephone; Contel; the Northeast/Midwest Institute; United States Telephone Association; governmental bodies in the U.K., Australia and New Zealand; the European Commission on Open Network Provision; British Telecom; Mercury Communications, Cable & Wireless and Australian Telecom. Most of NERA's work in the U.S. has been performed in connection with regulatory and legal proceedings. In addition to participating in telecommunicatons restructuring and privatization efforts abroad, NERA has conducted numerous surveys, statistical studies and analyses to identify demand for telecommunications services.